

## **REMARKS**

### **A. Status of the Claims**

By the present amendment, claims 1, 9, and 17-23 have been amended to more particularly define the Applicants' invention and to claim it with greater specificity and accuracy. Claim 12 was canceled previously. No new matter has been added.

More specifically, each of claims 1 and 9 has been amended and now requires that the position of the amino groups be "readily accessible within pore volumes, pore surfaces or pore walls of the mesoporous silica or organosilica." Support for this amendment can be found throughout the application as originally filed. For example, amino groups are present at least at the pore surface in the surface functionalized materials described at page 4, column 2, to page 5, column 1, paragraphs [0039] to [0042] (and Figures 2 and 3) of the published application; amino groups are present at least in the pore wall in the materials described at page 5, column 1, paragraphs [0043] and [0044] (and Figure 4) and page 5, column 2, paragraph [0047] (and Figure 7) of the published application; and amino groups are present at least in the pore volume of the material described at page 5, column 1, paragraphs [0045] - [0046] (and Figures 5 and 6) of the published application.

In addition, claim 1 has been amended to specify that the claimed adsorbent has "a carbon dioxide adsorption capacity of at least 2.50 cc/g at standard temperature and pressure." This limitation is disclosed in the original specification as filed. See, for example, Tables 3-5, wherein the lowest carbon dioxide adsorption capacity was measured using a sample of the claimed material (identified as "SA-129" in Table 3). All other carbon dioxide adsorption capacities were higher than 2.50 cc/g at standard temperature and pressure.

Also, due to a clerical error, claims 17 and 18 were previously fused. Accordingly, claims 17-23 have been amended to eliminate the error and confusion that followed. Particularly, in claim 17, step (c) was deleted, and support to amendments to claims 18-23 may be found in the original claims 18-23.

After the present amendment has been entered, claims 1-11 and 13-25 will be pending and under consideration.

**B. Claims Objections**

The Examiner has objected to claim 21, which includes an error in the claim dependency (lines 1-2 on page 2 of the Office Action). This has been corrected by amending claim 17 such that it is properly split into claims 17 and 18 as originally filed. As a result, the subject matter recited in claim 21 is now in claim 22 (as originally filed), which is properly dependent on claim 21. Accordingly, the objection has become moot. Reconsideration and withdrawal of the objection are respectfully requested.

**C. Rejections Under 35 U.S.C. § 112, Second Paragraph**

Claims 1 and 9 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regard as the invention (the middle of page 2 of the Office Action).

The Examiner has suggested that the limitation “the pore channels” in both claims 1 and 9 lacks antecedent basis. It is submitted that this rejection has been overcome by the amendment to claims 1 and 9, which does not make use of the definite article in referring to the pore volumes, pore surfaces or pore walls of the mesoporous silica or organosilica.

In addition, claim 17 has also been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite (the penultimate paragraph on page 2 of the Office Action). This rejection is a result of a clerical error, whereby claims 17 and 18 were inadvertently fused during preparation of the Preliminary Amendment which was filed previously. It is submitted that this rejection has been also overcome by the amendment to claims 17 and 18.

In view of the foregoing, it is respectfully submitted that claims 1, 9, and 17 are now clear and definite. Accordingly, the rejections under 35 U.S.C. § 112, second paragraph, no longer apply because the Reconsideration and withdrawal of the rejection are respectfully requested.

**D. Double Patenting**

The Examiner has raised the “double patenting” issue on the basis that claims 23 and 24 are the same. Claim 23 has been amended, and it is submitted that now claims 23 and 24 are not the same. Indeed, claim 23 as amended recites a binder that is an “inert secondary material,” while claim 24 is directed to binder that is an “active secondary material.”

Accordingly, the issue has become moot. Reconsideration is respectfully requested.

**E. Rejections Under 35 U.S.C. § 102 (b)**

Claims 1-5, 7 and 13-19 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by the article by Stein et al. (*Advanced Materials*, vol. 12, No. 19, pp.1403-1419, 2000)(“Stein”) (the last paragraph on page 3 of the Office Action).. The rejection is respectfully traversed on the following grounds.

It is axiomatic that a valid rejection of a claim for anticipation by a reference requires that the reference explicitly or inherently describe all of the elements, limitations, and relationships recited in the claim. It is also well established that to have a proper rejection under 35 U.S.C. §102, each and every element of the claimed subject matter has to be found, either expressly or inherently described, in a single prior art reference (*Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987); see also MPEP § 2131).

The Examiner proposes to use Stein as such a single prior art reference. As can be seen, claim 1, as amended, now requires that “the adsorbent has a carbon dioxide adsorption capacity of at least 2.50 cc/g at standard temperature and pressure.” Certainly there is no teaching or suggestion in Stein of any amine modified mesoporous silicates that have a CO<sub>2</sub> adsorption capacity of at least 2.50 cc/g at standard temperature and pressure. All that is disclosed by Stein is mesoporous silicates that have been modified by incorporating organic components (such as amines) on the silicate surface, as part of the silicate walls or trapped within the channels. Stein teaches that the disclosed material can be used as a sorbent but, as acknowledged by the Examiner, Stein does not teach the use of the sorbent for CO<sub>2</sub> scrubbing.

Accordingly, claim 1 is considered patentably distinguishable over Stein. Each of claims 2-5, 7 and 13-19 depends on claim 1 and is accordingly considered patentable for at least the same reason. Withdrawal of the rejection and reconsideration are respectfully requested.

**F. Rejections Under 35 U.S.C. § 103(a)**

Claims 6, 8-11, and 20-25 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Stein and further in view of U.S. Patent No. 5,876,488 to Birbara et al. ("Birbara") (the last paragraph on page 4, and the second paragraph on page 5 of the Office Action). The rejections are respectfully traversed on the following grounds.

The Applicants submit that in order to make a valid rejection based on a *prima facie* case of obviousness, a combination of references must satisfy the requirements of KSR International v. Teleflex Inc., 127 S.Ct. 1727, 82 USPQ 2d. 1385 (2007). Under the KSR rule, three basic criteria are considered. First, some suggestion or motivation to modify a reference or to combine the teachings of multiple references still has to be shown. Second, the combination has to suggest a reasonable expectation of success. Third, the prior art reference or combination has to teach or suggest all of the recited claim limitations. Factors such as the general state of the art and common sense may be considered when determining the feasibility of modifying and/or combining references. The Applicant respectfully submits that the Examiner has not established a *prima facie* case of obviousness based on this standard or according to the modified standard.

The Examiner has suggested that Birbara teaches the process of using secondary amines containing multiple hydroxyl groups, including diethanolamine, and that it would have been obvious to one skilled in the art to make use of these amines in the material disclosed by Stein. The Applicant respectfully disagrees.

Birbara does not disclose modified mesoporous silicates. Rather, Birbara discloses a regenerable supported amine sorbent in which the amine support is, for example, alumina, zeolite, carbon molecular sieves, ion exchange resins or polymeric absorbent resins. The disclosed sorbents are disclosed as being useful in a system for cyclically absorbing and desorbing CO<sub>2</sub>. There is no disclosure in Birbara of any amine modified mesoporous silica, with

or without the recited CO<sub>2</sub> adsorption capacity. Therefore, the combination of references made by the Examiner fails to teach or suggest all of the recited claim limitations, thus failing to satisfy at least one prong of KSR.

Moreover, a worker skilled in the art having regard to Stein and Birbara would not have expected that the amines used by Birbara would have been useful in modifying mesoporous silicates as in Stein, to generate an adsorbent having a CO<sub>2</sub> adsorption capacity of at least 2.50 cc/g at standard temperature and pressure. As such, Birbara does not rectify the deficiencies of Stein. Although Birbara does contemplate CO<sub>2</sub> adsorption, it is was achieved using different material that could not have allowed a worker skilled in the art to predict the CO<sub>2</sub> adsorption capacity of an adsorbent comprising surface or framework amine-functionalised mesoporous silica or organosilica.

In view of the foregoing, it is respectfully submitted that each of claims 6, 8-11, and 20-25 is patentably distinguishable over Stein in view of Birbara. Withdrawal of the rejection and reconsideration are respectfully requested.

In re Application of:  
Abdelhamid Sayari  
Application No.: 10/539,225  
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PATENT  
Attorney Docket No.: OSLER1120

**CONCLUSION**

In view of the above amendments and remarks, reconsideration and favorable action on all claims are respectfully requested. In the event any matters remain to be resolved, the Examiner is requested to contact the undersigned at the telephone number given below so that a prompt disposition of this application can be achieved.

The Commissioner is hereby authorized to charge \$555.00 as payment for the Petition for Three-Month Extension of Time fee to Deposit Account No. 07-1896. No other fee is believed due in connection with the filing of this paper. However, if any fee is due, the Commissioner is hereby authorized to charge any other fees that may be due in connection with the filing of this paper, or credit any overpayment to Deposit Account No. 07-1896, referencing the above-referenced Attorney docket number.

Respectfully submitted,



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